A. COVER SHEET

1. **Agricultural Project -- Individual Application**

2. **Proposal Title: Conversion from Flood and Sprinkler to Drip Irrigation to Improve WUE**.

3. **Principal applicant:** Irrigation Concepts, Inc.

4. **Contact:** Lance Goldsmith, Technical Sales and Service Representative.

5. **Mailing Address:** P.O. Box 307, McFarland, CA 93250

6. **Telephone:** Office: (661)792-1886 Mobile: (661)747-7147

7. **Fax:** (661)792-1817

8. **E-mail:** Lagold24@cs.com

9. **Funds requested:** $1,001,675.00

10. **Applicant cost share funds pledged:** $1,671,540.00

11. **Duration (month/year to month/year):** Sept 2001 to Oct 2002

12. **State Assembly Districts:** 25, 26, 29, 30, 31, and 32

    State Senate Districts: 12, 14, and 16

    Congressional Districts: 18, 19, 20, and 21

13. **Location:** Central and Southern San Joaquin Valley, North of Maricopa, CA and South of Merced, CA.

14. **Name and signature of official representing applicant.** By signing below, the applicant declares the following:
    - the truthfulness of all representations in the proposal;
    - the individual signing the form is authorized to submit the application on behalf of the applicant;
    - The applicant will comply with contract terms and conditions identified in Section 11 of this PSP.

_____ _____

(printed name of applicant) (date)

_____ _____

(signature of applicant) (date)

B. SCOPE OF WORK

Relevance and Importance

1. **Abstract.** This project will convert the irrigation systems on 1500 acres of vineyard, orchard, and/or truck crops from flood and sprinkler to drip in one or all of the following sub-regions: 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, and 21. This project addresses one or all of the following CALFED Quantifiable Objectives as they correspond to the preceding sub-regions: 107, 144, 157, 164, 168, 176, 180, 184, 189, 193, and 197 which all read, "Decrease nonproductive ET to increase water supply for beneficial uses." This project provides: 1) The design, materials, and installation of a new drip system and 2) irrigation scheduling and system monitoring for one season after the new system is installed. The scheduling and monitoring will provide information that can be compared to the assumptions in Step 2A on page 33, Section IV of "Details of Quantifiable Objectives," which states that ET would be reduced by 10% by converting from flood to drip irrigation. The overall objective of this project is to enable Irrigation Concepts to supply growers who are currently using flood or sprinkler irrigation, with a drip irrigation system and the tools to use it successfully, at a reduced price. Growers who would not otherwise convert their systems will be given an incentive to do so, thereby leading them to make future conversions on at full price.

2. **Need for Project.** This project will fill the need of local growers to be more profitable by being more efficient. Providing growers with an irrigation system that is more efficient and more easily managed than their current system would do this. With training, the growers could realize some or all of the following benefits: more efficient use of water and fertilizer, reduced labor costs, increase in cultural practice flexibility, potential increase in quality and/or yield of crops.

   This project will fill one of the following two critical Bay-Delta needs:

   a. Decrease nonproductive ET to increase water supply for beneficial uses by converting flood irrigated fields to drip irrigated fields on eligible crops. This Bay-Delta need is embodied in CALFED Quantifiable Objectives: 107, 144, 157, 164, 168, 176, 180, 184, 189, 193, and 197.
      OR
   b. Real world practical data that shows an error in the assumption that converting systems from flood irrigation to a well managed and scheduled drip system will automatically reduce non productive ET by 10%.

   This project is consistent with the ideas concerning water savings and irrigation system efficiency put forward by the Friant Water Users Authority in the "Waterline Irrigation Tech-Line" publication, and by the Kings River Conservation District's "Irrigation News." Drip system conversions are currently made every year without opposition from water districts or any government agency.

3. **Nature, Scope, and Objectives.** This project would replace flood and sprinkler irrigation systems with surface or sub-surface drip irrigation systems on orchards, vineyards, and/or truck crops. The new systems would be designed with a new system distribution uniformity of at least 90% on vineyards and orchards, and at least 85% on truck crops. A complete turnkey system will be installed, and for the following season, scheduled and monitored.

   The scope of this project is to provide materials for, install, schedule, and monitor turnkey drip irrigation systems. The specific material and installation requirements would change from field to field. All systems would require filters, above ground materials (tubing and emitters), control valves, and below ground pipelines. Some systems would require booster pumps and reservoirs. All irrigation systems would be scheduled for one season by a professional irrigation scheduler. All irrigation systems will be monitored for one season. All data, including weather conditions, water usage, power usage, problems, and benefits will be recorded and reported.

   The objectives of this project are:
   a. To provide the grower with a tool, in the form of a new drip irrigation system, that is more efficient and easier to manage than what he currently has, and to provide him with a season of professional scheduling

and monitoring that will show the maximum potential of the system. The primary obstacle to converting acreage more rapidly is the difficulty in justifying the associated costs to a grower who hasn't seen the benefits first hand. By providing financial incentives to growers to convert, their perceived risk is lessened. Once a grower experiences the benefits of drip irrigation, the cost of not converting the rest of his acreage normally appears greater than the expense to convert.

b. To follow CALFED'S prescription for decreasing nonproductive ET to increase water supply for beneficial uses (Quantifiable Objectives: 107, 144, 157, 164, 168, 176, 180, 184, 189, 193, and 197 in sub-regions: 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, and 21). The prescription as explained in Step 2A on page 33, Section IV of "Details of Quantifiable Objectives," states that ET would be reduced by 10% by converting from flood to drip irrigation. The systems will be professionally scheduled and monitored, so as to run them as efficiently as possible. Water use data from these optimal conditions will be compared to the Target ETAW values for the corresponding sub-region. The goal is to meet the Quantifiable Objective in that sub-region in so far as it is possible to do so.

Technical/Scientific Merit, Feasibility, Monitoring, and Assessment

4. Methods, Procedures, and Facilities. The proposed irrigation system conversions, along with professional scheduling and monitoring of the systems, meets the objectives listed in Section B3 of this proposal. Through this proposal, Irrigation Concepts is proposing to meet the Target ETAW for the corresponding sub-regions as listed in Table 1 below (values taken from "Details of Quantifiable Objectives," Appendix A, CALFED Water Use Efficiency). This proposal is based on:

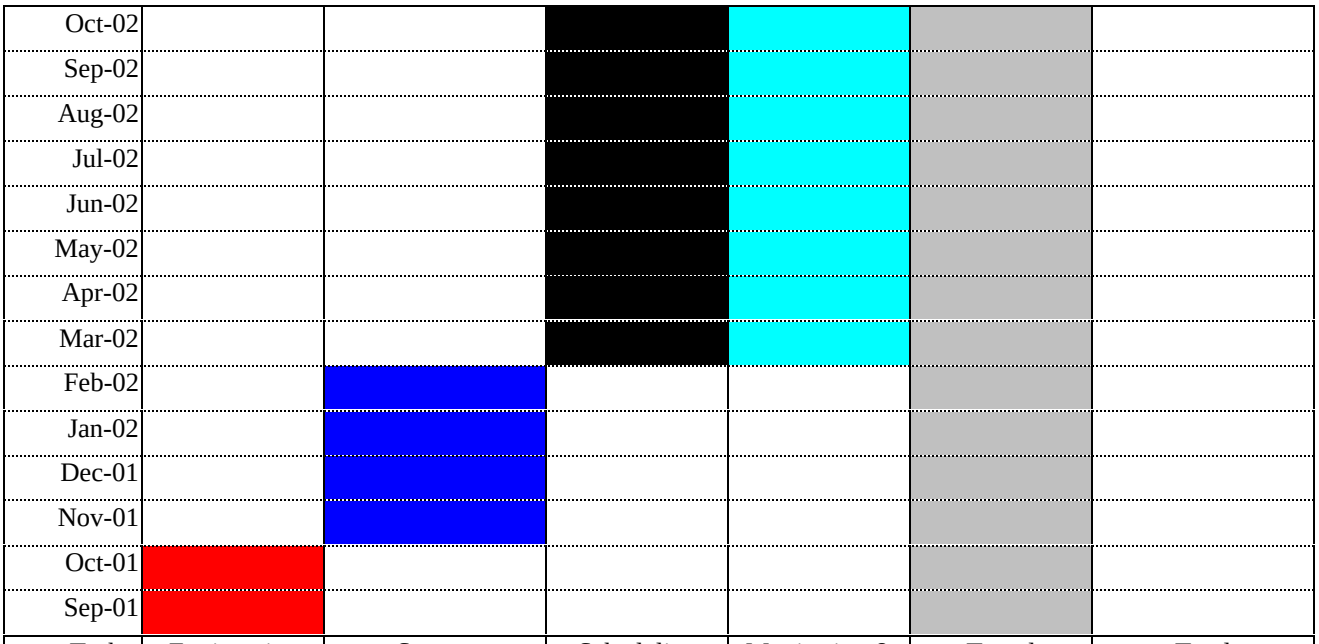
a. CALFED's assumption in Step 2A on page 33, Section IV of "Details of Quantifiable Objectives," which states that ET would be reduced by 10% by converting from flood to drip irrigation.
b. CALFED's values for existing crop ET are correct as stated in Appendix A of "Details of Quantifiable Objectives."
c. CALFED's values for ET from rain are correct as stated in Appendix A of "Details of Quantifiable Objectives."

Table 1. Target ETAW by Sub-Region (source: Appendix A, "Details of Quantifiable Objectives")

Sub-Region	QO	Year Type	Target ETAW for Sub-Region (inches)											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10	107	Wtd Avg.	-	-	-	1.01	2.71	4.75	5.02	3.96	1.38	1.03	0.02	-
12	144	Wtd Avg.	0.11	0.54	0.41	1.63	4.04	5.18	5.52	4.73	2.97	1.43	0.74	0.35
13	157	Wtd Avg.	-	0.03	0.25	1.26	3.72	5.35	5.93	5.06	2.66	0.75	-	-
14	164	Wtd Avg.	0.05	-	-	2.19	4.36	5.23	3.92	1.88	-	-	0.06	0.04
15	168	Wtd Avg.	0.29	0.02	0.07	1.21	3.45	5.14	5.64	4.66	0.99	0.54	0.19	0.22
16	176	Wtd Avg.	-	-	0.10	0.81	3.31	4.88	5.26	4.24	2.20	0.57	-	0.04
17	180	Wtd Avg.	-	-	0.02	0.79	3.39	4.96	5.53	4.59	2.51	0.62	-	-
18	184	Wtd Avg.	0.12	-	0.45	1.50	3.61	4.70	5.01	4.39	1.50	0.86	0.02	-
19	189	Wtd Avg.	0.40	0.27	0.49	1.82	3.76	5.09	5.26	4.50	1.22	0.56	0.60	0.42
20	193	Wtd Avg.	0.15	0.07	0.24	1.35	3.60	4.81	5.28	4.49	1.87	0.74	0.08	0.01
21	197	Wtd Avg.	0.08	-	-	1.32	3.00	4.20	4.33	3.31	0.57	0.38	0.09	0.10

5. Schedule.

Table 2. Schedule of tasks and associated cost breakdown.



Tasks:	Engineering	System Installations (Materials & Labor)	Scheduling	Monitoring & Analysis	Travel	Total
Task Cost (Local Share)	$ -	$ 850,875.00	$ -	$ -	$ -	$ 850,875.00
Task Cost (CALFED Share)	$ 52,500.00	$ 850,875.00	$ 33,000.00	$ 52,500.00	$ 12,800.00	$ 1,001,675.00
Total	$ 52,500.00	$ 1,701,750.00	$ 33,000.00	$ 52,500.00	$ 12,800.00	$ 1,852,550.00

6. Monitoring and Assessment. The drip systems, once installed, will be set and checked at the beginning of irrigations to ensure that the systems are running at the maximum possible uniformity. Checking pressures at critical spots in the field will do this. These values will be recorded as part of the irrigation log. Irrigations will be scheduled on a weekly basis by a professional irrigation scheduler. Flow meters with volumetric totalizers will be installed on each system, so the volume of water applied during each irrigation can be recorded. Rain gauges will be installed in each field so that ET from rain may be recorded. Progress toward the Quantifiable Objective will be measured by comparing the inches of water applied each month to the targeted monthly ETAW, taking into account monthly rainfall. These comparisons will be available monthly, and will be submitted with each progress report.

C. OUTREACH, COMMUNITY INVOLVEMENT, AND INFORMATION TRANSFER

1. Growers in the Central and Southern San Joaquin Valley are the disadvantaged group of people that will see the benefits of this project. While providing the nation and world with agricultural products, many growers are facing huge obstacles to remaining in business. The combination of low prices for their products and rising costs of virtually every input in their operations has brought the growers in this area to a point where the efficiency of their operations has to be optimized.

2. The duration of this project is one year. However, the training of growers and irrigators that will occur during this year will carry on for the life of the system that is installed. Additionally, the irrigators who receive this training will increase their value to their employer's, which will enable those individuals to benefit indirectly from this project.

3. Upon completion of the project, reports on individual systems, as well as an overall summary of the project's results will be freely disseminated by whatever means CALFED views as most beneficial to any interested or affected party.

4. Drip irrigation systems are installed every year, and it is not probable that any local land use entity, water district, or any other agency would be in opposition to that continuing. Therefore, it is unclear who should be notified of this project through a letter.

D. QUALIFICATIONS OF THE APPLICANTS, COOPERATORS, AND ESTABLISHMENT OF PARTNERSHIPS

1. Resumes. (See page 8)

2. The participants in this project would be CALFED, Irrigation Concepts and the growers who are converting their irrigation systems. The irrigation scheduling portion of the project would be an outside consultant.

3. No partnerships have been developed for this project.

E. COSTS AND BENEFITS

1. Budget Summary and Breakdown. See Table 3 for budget summary.

2. Budget Justification.

Irrigation Scheduling. The irrigation scheduling will be sub-contracted to a professional irrigation scheduler with several years of experience. The costs associated with irrigation scheduling are based on typical rates for these services.

Travel. The travel costs are due to the wide geographical area covered by this project, and the need to monitor the projects closely.

Engineering. The costs associated with the engineering are typical in the irrigation industry.

System Monitoring. A competent individual must monitor irrigations to ensure that the irrigation systems are running optimally, ensure that the scheduling information is implemented, and keep detailed records throughout the season. The data must be analyzed on a continual basis, and progress reports made available monthly.

Irrigation System Installation. The costs of system installations are estimated based on years of experience. Some growers may not need reservoirs and booster pumps, which would remove the associated labor costs from that particular system.

3. Benefit Summary and Breakdown.

a. Quantifiable Benefits.

Growers receive a benefit by physically receiving a new drip irrigation system at a reduced cost.

Irrigation Concepts benefits by making a profit on the materials for and installation of the drip systems.

CALFED benefits from this project by implementing their recommended procedures for decreasing nonproductive ET to increase water supply for beneficial uses. The targeted results are listed in Section B4 of this proposal. The proposed reduction in ETAW is 10% as compared to the values they give for existing crop ET. CALFED will benefit by either achieving these results, or by learning that different assumptions must be made in the procedures they recommend for achieving these results.

b. Non Quantifiable Benefits.

Growers. In addition to the reduced cost of the actual irrigation system, growers are receiving a system that has the potential with proper management, to make them more profitable through efficiency. A properly designed, installed, and managed drip irrigation system leads to more efficient use of labor, chemicals, energy, and water.

CALFED and Irrigation Concepts. Irrigation Concepts, other irrigation dealers, and the entire drip irrigation industry, along with CALFED, also benefit when these growers see the benefits of converting to drip irrigation first hand. It is highly likely, considering the extremely competitive nature of agriculture today and the necessity to be as efficient as possible, that these growers will continue to convert the remainder of their land to drip irrigation without future incentives.

Table 3. Budget Summary.

Item	Amt. ($)	Unit	Qty	Total Cost ($)	Units	Life (yrs)	Present Value ($)	Local Share ($)	CALFED Request ($)
a. Salaries and Wages									
Maintenance Labor [1]	$ 20.00	$/ac	1500	$ 30,000.00	$	20	$ 364,740.00	$ 364,740.00	$ -
b. Fringe Benefits [None]									
c. Supplies [2]									
Booster Pumps	$ 62.50	$/ac	1500	$ 93,750.00	$	20	$ 93,750.00	$ 46,875.00	$ 46,875.00
Filter Stations	$ 150.00	$/ac	1500	$ 225,000.00	$	20	$ 225,000.00	$ 112,500.00	$ 112,500.00
Reservoirs Structures	$ 64.00	$/ac	1500	$ 96,000.00	$	20	$ 96,000.00	$ 48,000.00	$ 48,000.00
Infield Materials	$ 320.00	$/ac	1500	$ 480,000.00	$	20	$ 480,000.00	$ 240,000.00	$ 240,000.00
d. Equipment [None]									
e. Services or Consultants									
Irrigation Scheduling	$ 22.00	$/ac	1500	$ 33,000.00	$	1	$ 33,000.00	$ -	$ 33,000.00
f. Travel	$0.32	$/mile	40000	$ 12,800.00	$	1	$ 12,800.00	$ -	$ 12,800.00
g. Other direct costs including planning design construction, maintenance, etc.									
Engineering	$ 35.00	$/ac	1500	$ 52,500.00	$	20	$ 52,500.00	$ -	$ 52,500.00
System Monitoring & Analysis	$ 35.00	$/ac	1500	$ 52,500.00	$	1	$ 52,500.00	$ -	$ 52,500.00
Booster Pumps Installation [3]	$ 60.00	$/ac	1500	$ 90,000.00	$	20	$ 90,000.00	$ 45,000.00	$ 45,000.00
Filter Stations Installation [3]	$ 42.00	$/ac	1500	$ 63,000.00	$	20	$ 63,000.00	$ 31,500.00	$ 31,500.00
Reservoir Structures Installation [3]	$ 86.00	$/ac	1500	$ 129,000.00	$	20	$ 129,000.00	$ 64,500.00	$ 64,500.00
Reservoir Construction [3]	$ 50.00	$/ac	1500	$ 75,000.00	$	20	$ 75,000.00	$ 37,500.00	$ 37,500.00
Infield Materials Installation [3]	$ 300.00	$/ac	1500	$ 450,000.00	$	20	$ 450,000.00	$ 225,000.00	$ 225,000.00
Power Increase [4]	$ 25.00	$/ac	1500	$ 37,500.00	$	20	$ 455,925.00	$ 455,925.00	$ -
h. Total Estimated costs: total items (a through g)							$ 2,673,215.00	$ 1,671,540.00	$ 1,001,675.00

[1] Maintenance costs essentially balance out on an aging flood system vs. a new drip system

[2] Local share of supplies costs are equal to 50% of total costs, and reflect a value associated with improved manageability, more efficient use of chemicals, and possible yield increases due to increased irrigation system uniformity.

[3] Local share of installation costs are equal to 50% of total costs, and reflects a value associated with improved manageability, more efficient use of chemicals, and possible yield increases due to increased irrigation system uniformity.

[4] Power increases offset by savings due to efficiency increases in labor, chemicals, etc.

4. Assessment of Costs and Benefits.

Table 4. Quantified and Non-Quantified Costs and Benefits.

Item	Amount	Units	Qty	Total Cost ($)	Units	Life (years)	Present Value ($)	Beneficiary
Quantified Costs								
Maintenance Labor	$ 20.00	$/ac	1,500	$ 30,000.00	$	20	$ 364,740.00	n/a
Booster Pumps	$ 62.50	$/ac	1,500	$ 93,750.00	$	20	$ 93,750.00	n/a
Filter Stations	$ 150.00	$/ac	1,500	$ 225,000.00	$	20	$ 225,000.00	n/a
Reservoirs Structures	$ 64.00	$/ac	1,500	$ 96,000.00	$	20	$ 96,000.00	n/a
Infield Materials	$ 320.00	$/ac	1,500	$ 480,000.00	$	20	$ 480,000.00	n/a
Irrigation Scheduling & Training	$ 22.00	$/ac	1,500	$ 33,000.00	$/yr	1	$ 33,000.00	n/a
Travel	$ 0.32	$/mile	40,000	$ 12,800.00	$/yr	1	$ 12,800.00	n/a
Engineering	$ 35.00	$/ac	1,500	$ 52,500.00	$	20	$ 52,500.00	n/a
System Monitoring & Analysis	$ 35.00	$/ac	1,500	$ 52,500.00	$/yr	1	$ 52,500.00	n/a
Booster Pumps Installation	$ 60.00	$/ac	1,500	$ 90,000.00	$	20	$ 90,000.00	n/a
Filter Stations Installation	$ 42.00	$/ac	1,500	$ 63,000.00	$	20	$ 63,000.00	n/a
Reservoir Structures Installation	$ 86.00	$/ac	1,500	$ 129,000.00	$	20	$ 129,000.00	n/a
Reservoir Construction	$ 50.00	$/ac	1,500	$ 75,000.00	$	20	$ 75,000.00	n/a
Infield Materials Installation	$ 300.00	$/ac	1,500	$ 450,000.00	$	20	$ 450,000.00	n/a
Power Increase	$ 25.00	$/ac	1,500	$ 37,500.00	$/yr	20	$ 455,925.00	n/a
Subtotal							$ 2,673,215.00	
Quantified Benefits								
Savings in labor, chemicals, and water, and a possible yield increase	$ 1,114.36	$/ac	1,500	$ 1,671,540.00	$	20	$ 1,671,540.00	Growers in Sub-Region
Subtotal							$ 1,671,540.00	
Non-Quantified Costs								
[None]								
Non-Quantified Benefits								
Reduce ETAW for Quantifiable Objective	10%	in/Wtd. Avg year	n/a	n/a	n/a	n/a	n/a	CALFED (Quantifiable Objective 107*)
* Quantifiable Objectives 144, 157, 164, 168, 176, 180, 184, 189, 193, and 197 also represented depending on Sub-Region								
Analysis Assumptions								
Discount rate is 6%.								
Present value of costs and benefits are provided in year 2000 dollars.								

Lance Goldsmith

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EDUCATION:

Bachelor of Science in Agricultural Engineering **12/96**
California Polytechnic State University, San Luis Obispo, CA
Major GPA: 3.5
Overall GPA: 3.1
Senior project: Analysis of dimensionless control logic on canals using Proportional-Integral control logic.
Engineer in Training Exam passed **10/96**

RELATED WORK EXPERIENCE:

Technical Sales 10/98 - present
Irrigation Concepts, McFarland, CA
- Irrigation system sales, design, and installation specializing in drip irrigation.
- Hands on involvement as well as supervision of construction crews, construction foremen and sub-contractors.
- Design, installation, and management of retrievable subsurface drip irrigation systems on melons and tomatoes.
- Design and installation supervision of irrigation system conversions on vineyards, including both sprinkler to drip and flood to drip.

Technical Representative **12/96-10/98**
Hydratec, Delano, CA
- Irrigation system sales, design, and installation specializing in drip irrigation.
- Hands on involvement as well as supervision of construction crews, construction foremen and sub-contractors.
- Assisted in the design, construction, trouble shooting, and maintenance supervision of several hundred acres of vineyards on the Central Coast area of California.

Engineer Assistant **6/95 – 12/96**
Cal Poly Irrigation Training and Research Center, Cal Poly, San Luis Obispo, CA.
- Installation of irrigation filter station including layout, fabrication, and electrical and hydraulic connections.
- Canal automation research using CanalCAD computer modeling and various forms of PI control logic.
- Assisted with several short courses including hydraulics, drip tape and hose analysis, pump analysis, flow rate analysis, and CanalCAD demonstrations.
- Assisted Civil Engineers with day to day work.
- Irrigation practice field and water delivery facility maintenance and repair.

Farm Foreman/ Laborer **6/90 – 9/93**
Bruce Goldsmith Farms, Bakersfield, CA.
- Co-foreman over 1200 acres of row crops. Responsibilities involved ground prep, planting, irrigation, chemigation and harvesting.
- Maintenance, repair, and operation of linear move sprinklers and hand move sprinkler pipe.
- Maintenance, repair, operation, supervision of farm machinery and equipment.

HONORS, AWARDS, OFFICES HELD:
- Ag Engineering Society Outstanding Senior Award, Cal Poly, SLO. (4/96)
- President, Agricultural Engineering Society, Cal Poly, SLO. (95/96)
- Merriam Endowment Award (4/95)